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[From Annual Reports of the Department of Agriculture for 1913.]

REPORT OF CHIEF OF BUREAU OF BIOLOGICAL SURVEY.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF BIOLOGICAL SURVEY,
Washington, D. C., September 15, 1913.

SIR: I have the honor to submit herewith a report on the work of the Biological Survey for the fiscal year ended June 30, 1913.

Respectfully,

HENRY W. HENSHAW,
Chief, Biological Survey.

Hon. DAVID F. HOUSTON,
Secretary of Agriculture.

WORK OF THE BIOLOGICAL SURVEY.

The work of the Bureau of Biological Survey as usual was conducted along three lines: (1) Investigations of the food habits of North American birds and mammals in relation to agriculture, in charge of Dr. A. K. Fisher; (2) biological investigations with special reference to the geographic distribution of native animals and plants, in charge of E. W. Nelson; (3) supervision of national bird and mammal reservations, the preservation of game, and the enforcement of the Lacey Act, in charge of Dr. T. S. Palmer.

PRAIRIE DOGS IN THE NATIONAL FORESTS.

Attempts to eliminate prairie dogs from the national forests were continued in Pike and Cochetopa Forests of Colorado, and in the Coconino Forest of Arizona, and 30 tons of poisoned grain were used in the work. A party will endeavor to complete the work in the Cochetopa National Forest, where since last September 85 per cent of the prairie dogs were killed from 278,000 acres. Among the important results expected to follow the destruction of prairie dogs in the areas in question are:

1. Prevention of the extensive erosion of the soil in many localities where the grass has been literally eaten out by the roots by the rodents.

2. A material increase of profit to the Government from the issuance of grazing permits in consequence of a substantial increase of forage.

Prairie dogs are most economically killed by the use of poison, but in certain restricted areas carbon bisulphid has proved an effective aid in completing the work of extermination. The extensive use of the gas, however, is not recommended, since it kills the small predaceous mammals which enter the burrows for the purpose of feeding on the rodents. After approximately 85 per cent of the prairie dogs have been killed by poison it is believed that predaceous

mammals, together with birds of prey, will prevent material increase in their number, and so render unnecessary the work of complete extermination, which relatively is very costly. The cost of exterminating prairie dogs by means of poisoned grain, including the labor, is about 5 cents per acre under average conditions, and with bisulphid from three to five times that amount.

DESTRUCTION OF GROUND SQUIRRELS IN THE NATIONAL FORESTS.

The work of destroying ground squirrels in the national forests is doubly important in view of the fact that ground squirrels not only inflict great damage upon forage and crops, but in California have been found to be infected with the plague.

A reconnoissance for the purpose of finding where ground squirrels were most numerous was made in the following national forests of California: Stanislaus, Tahoe, Sierra, Sequoia, Kern, Monterey, and Santa Barbara, but the aggressive campaign against the rodents was carried on chiefly in the four last-named forests, since these were the only ones near the plague-infested region in which ground squirrels were found to be very abundant.

Poisoning was found the most efficient and economical method of exterminating ground squirrels. The average cost, as determined by work in the Santa Barbara Forest, was slightly more than 3 cents per acre. Carbon bisulphid, while very efficient, costs about 10 times as much.

SEED-EATING RODENTS IN THE NATIONAL FORESTS.

The Forest Service is engaged in reforesting considerable tracts of the national domain which have been deforested by excessive lumbering or by forest fires. This important work has been seriously hampered and the cost greatly increased by the destruction of the seeds by small rodents after planting.

Investigations of the problem of freeing the seeded areas in the national forests from these destructive rodents were continued during the early part of the year in the Snoqualmie and Olympic National Forests in Washington and the St. Joe and Cœur d'Alene National Forests in Idaho. Chipmunks, white-footed mice, and pine squirrels were found to be the principal culprits, and experiments in poisoning them confirmed the results published by the Biological Survey in its circular No. 78. It has been found to be comparatively easy and economical to extirpate these small rodents on seeded areas, and the directions have been formulated so that the work can be done successfully by nonexperts.

ECONOMIC STATUS OF THE MOLE.

In spite of the fact that under natural conditions moles are insectivorous and almost exclusively beneficial, complaints are constantly received of their undesirable activities in flower beds, lawns, golf links, and similar places where smoothness and sightliness of the turf are desirable. It has been necessary, therefore, to devise methods of destroying moles under these special conditions. On account of the nature of their food, which consists chiefly of insects, it is impracticable to kill them with poisoned baits. Trapping is

effective, particularly when the operator knows the habits of the animals. The trap devised in the Biological Survey and patented for the benefit of the public was further tested and found very efficient. Although the fur of American moles is of good quality and in considerable demand, the prices are too low to induce any considerable number of American citizens to become mole catchers. It is possible that when the efficiency and use of the better makes of traps are more widely understood the farmer's boy may be tempted to add to his supply of pocket money by trapping moles.

FUR FARMING.

During the year progress has been made in experiments in the breeding of fur bearers, especially minks. A location for the purpose was secured near Prichard, Idaho, in the Coeur d'Alene National Forest, where necessary buildings and cages have been built, and an experienced man is now in charge. A stock of adult minks was assembled, and the results of the first year's breeding is awaited with interest. In cooperation with the National Zoological Park, Washington, D. C., an experiment in the breeding of minks is under way. A number of adult minks have been caged, and an attempt will be made to breed them for size, quality of fur, and disposition.

DEMONSTRATIONS FOR THE CONTROL OF CRAWFISH IN MISSISSIPPI.

During the fiscal year 1912–13 experiments were made in the Houston Clay formation near Muldon, Miss., to devise economical methods for the control of crawfish. Though small and apparently insignificant, these crustaceans are so numerous in the black prairie soil that they destroy great quantities of forage and produce and seriously interfere with the development of cotton and corn throughout the area they infest. The experimental plot, containing about 75 acres, was purposely chosen from pasture land where the infestation was great, an average of 10,000 crawfish holes being found to the acre. Under the old method of catching the animals by hand at night the cost varied from $6 to $10 per acre. By the use of carbon bisulphid, according to the method devised by the Biological Survey, these pests can be practically exterminated at an expenditure of from $1.75 to $2.50 per acre.

DESTRUCTION OF THE ALFALFA WEEVIL BY BIRDS.

The alfalfa weevil, a dangerous enemy to the alfalfa industry, has become strongly intrenched in Utah and is now invading contiguous States. The knowledge, therefore, of the extent to which birds and mammals can be relied upon to check the spread of the pest becomes important. Much field work on the relation of vertebrates to the weevil, in Utah, was done during the spring and summer of 1912. Examination of the stomachs of birds frequenting the infested region shows that 41 species feed to a greater or less extent upon this beetle, and several species are exceedingly active in destroying it. Noteworthy among these is Brewer's blackbird. Upward of 100 of the insects are not uncommonly found in a single stomach,

and one individual had devoured 542. In the early spring, meadow larks and magpies render valuable aid by feeding extensively on the adult insects, which at this time emerge from hibernation, while a little later the good work is continued by robins, vesper sparrows, Brewer's sparrows, red-winged blackbirds, and killdeers, all of which species frequent infested fields. Quail, introduced into Utah from California, are fairly numerous over much of the infested area and eat many insects. One female was found to have eaten 141 larvæ. The fact that the larval period of the weevil is at its height when many birds have nestlings to feed makes the pest a staple article of diet. Thus it was found that about one-third of the food of nestlings of the English sparrow consisted of alfalfa weevils, and where alfalfa fields were readily accessible, young sparrows were fed almost exclusively upon weevils. However bad its record elsewhere, the English sparrow must be credited in Utah with doing good work for the farmer. The young of Brewer's sparrow and the yellow-headed blackbird, and even nestling magpies, are fed many weevils. Though it is impossible to express in figures the actual good done by the birds of this region in reducing the numbers and checking the spread of the weevil there can be no doubt that they render important service.

RELATION OF BIRDS TO THE BOLL WEEVIL.

Investigation of the relation of birds to the boll weevil in newly infested territory in Alabama and Mississippi was carried on during the entire growing season. It was learned that birds in newly invaded territory quickly learn to find and feed upon this pest. Upward of 50 species are known to destroy the boll weevil. The swallows in these States gave marked evidence of their ability to find and devour large numbers of boll weevils.

INDEX OF ECONOMIC ORNITHOLOGY.

A much-needed index to the papers relating to the food of birds published by the Biological Survey has been issued. No fewer than 131 publications relating to economic ornithology have been prepared by members of the bureau and published by the department during the years 1885 to 1911, inclusive. The index renders possible ready reference to everything the bureau has published on the food of the native birds. The total number of native birds which have been reported upon is 401; of foreign and introduced species, 59.

FOOD OF WILD FOWL.

A large number of stomachs of wild ducks were examined to determine the exact nature of their food. A trip was made to Avoyelles Parish, central Louisiana, to study the peculiar association of wild-duck foods growing there. As a result numerous seeds and other vegetable products which had hitherto baffled identification were traced to their mother plants. Studies of the food of ducks collected in this parish show how subject to local conditions is the dietary of wild fowl. Three of the most important food plants of ducks in Avoyelles Parish, which supply fully two-thirds of their food, are not known to be important in any other locality.

WORK IN THE ISLAND OF PORTO RICO.

Investigation of the birds of Porto Rico, undertaken last year at the request of and in cooperation with the board of commissioners of agriculture of that island, has been completed, the work having been carried on by an assistant of the bureau in all of the agricultural districts of the island. Extended field observations on the general habits of the island birds were made, and a sufficient number of stomachs were collected to give definite data as to the exact nature of the food of the several species. The examination of the material collected is being pushed as rapidly as possible, and a report on the subject will follow in due time.

Though the investigations were confined chiefly to cultivated districts, effort was made to study certain of the rarer forest-loving species that their economic relations might be understood. It is interesting to note that the herons of the island, which have suffered greatly at the hands of sportsmen and plume hunters, are of great value to the agriculturist. The killdeer also was found to be a very useful insect eater. The most serious insect pests of the island were ascertained to be the "changa," or mole cricket, and the May beetle, which make up a large part of the bill of fare of several abundant species of insectivorous birds.

For a subtropical region Porto Rico is strangely deficient in the number of species of birds, even when compared with the islands of the greater Antilles. The small number of individuals of certain varieties is no doubt due chiefly to the extensive deforestation that has taken place for agricultural purposes, the island having been extensively cultivated and rather densely populated for many years. Although no indigenous bird of economic importance has been actually exterminated, many species have been greatly reduced in numbers, especially the ground-frequenting kinds, which have suffered greatly by the introduction of the mongoose.

BIOLOGICAL INVESTIGATIONS.

The work of this section in investigating the distribution, migration, and habits of North American birds and mammals has been limited during the present year by lack of funds. Field work has been continued on a small scale in areas already under investigation, including Alabama, Arizona, California, Idaho, and North Dakota.

The usefulness of the biological surveys of the States is rapidly increasing through a widespread public interest in the conservation of the native birds and mammals. By means of these surveys the species inhabiting the several States are determined and their status as permanent residents or migrants made plain. Such surveys also determine the past and present distribution of the game birds and mammals. They thus afford the basis for regulations for protecting the species, especially the game birds and mammals, and show those best adapted for introduction into other areas. The biological surveys of California and Alabama are well advanced toward completion. In Arizona, North Dakota, and Idaho the work is about half done.

It has been impossible to complete the small amount of field work necessary to finish the survey of Wyoming. The final report on the

survey of New Mexico was sent to press at the end of the fiscal year, and the report on the biological survey of Lower California was completed for publication. The report on the birds of Texas is approaching completion, and that on the birds of Alabama is in an advanced state of preparation.

Many inquiries concerning the identity and distribution of birds and mammals have been received during the year from State institutions, farmers, and others, and more than 600 specimens of birds and a large number of mammals have been sent to this bureau for identification in this connection. In addition, State and county officials, notably in Wisconsin and Colorado, have requested the identification of scalps of wild animals submitted for bounties. This has resulted in preventing gross frauds under State bounty laws.

BIRD MIGRATION.

Reports have been received during the year from about 200 volunteer bird-migration observers throughout the United States and Canada. About 50,000 cards containing notes on birds, mainly referring to migration, were added to the office files. After the migratory-bird bill was passed, on March 4, 1913, reports on the migration of water fowl were obtained by correspondence from about 175 persons for use in connection with formulating regulations under this law.

From these reports and the mass of information already on file migration maps were prepared of each of the migratory game birds, and these served as the basis of the closed seasons finally recommended.

COOPERATION.

More requests for cooperation with State organizations in the biological surveys of States have been received than the funds will permit us to take up.

During the summer of 1912 Mr. F. K. Vreeland and Mr. W. F. Patterson volunteered to cooperate, mainly at their own expense, in working out the ranges of large game animals in northern British Columbia and secured for this bureau many specimens and much information from that region. In the fall Mr. Charles Sheldon joined E. W. Nelson in northern Arizona and at his own expense did an extremely useful piece of work in determining the abundance and distribution of the mountain sheep along the Grand Canyon of the Colorado.

IMPORTATION OF MAMMALS AND BIRDS. 1913

Constant vigilance is necessary to prevent the introduction into the country of pests whose ravages will cause losses running into the millions. None of the birds and mammals whose importation is specifically prohibited by law, as English sparrows, starlings, mongooses, and flying foxes or fruit bats, were offered for entry during the year, nor has careful inquiry revealed the surreptitious entry of any of these pests. Under the general authority conferred on the Secretary of Agriculture, entry was denied three consignments: (1) Twenty-four cardinals, from Tampico, Mexico, which were returned

at the expense of the shipper because of laws prohibiting the keeping of cardinals in captivity; (2) 25 hares, from New Zealand, intended for acclimatization; (3) 4 Java sparrows refused admission at Honolulu because of their destructive tendencies in rice fields.

During the year a great decline was noted in the importation of live pheasants from Canada, the decrease in the number of permits issued being from 130 in 1911 to 35 in 1912. Further evidence of the decline appears from the fact that the total number of pheasants imported during the year, including those brought from Europe, was only 9,417, as against 15,412 imported last year. A large increase in the importation of pheasant eggs, mainly from England, partly explains the decrease. The results obtained by raising pheasants from imported eggs instead of imported breeding stock will be carefully noted.

A decrease was noted also in the importation of European partridges, of which 10,283 were imported this year, as compared with 23,181 last year. The principal cause of this decline seems to be a lowered estimate of the partridge as a desirable introduction. A decrease from 7,751 to 2,936 of Mexican quail imported is due partly to the latter cause and partly to increased restrictions on importing these southern-reared birds into the United States for stocking northern covers, for which they are unfit.

The importation records for the year show a great increase in the number of guinea pigs brought from England for laboratory experiments. There were 12,112 of these little animals imported, as against 1,471 last year.

Special interest attaches to a consignment of birds for the New York Zoological Park entered on December 26, 1912, which contained such rare species as 2 Count Raggi's birds of paradise, 1 spotted bower bird, 2 lammergeyers, 3 Goliath herons, and 6 purple sunbirds. Among the rare and interesting mammals imported were a binturong, 2 pandas, and 5 Tasmanian devils.

The transactions of the year involved the issuance of 491 permits and the entry of 477,364 birds and 17,272 mammals, as against last year's issue of 583 permits and the entry of 457,077 birds and 5,457 mammals. Inspections at New York, Philadelphia, and San Francisco, where all but an insignificant portion of the entries are made, numbered 179, as compared with 140 in 1912. The birds comprised 451,899 nongame birds (392,422 canaries and 59,477 miscellaneous birds) and 25,465 game birds (9,417 pheasants, 10,283 partridges, 2,936 quail, and 2,829 miscellaneous game birds). Of the entries of the year the following were admitted under permit: 368,112 canaries, 55,301 miscellaneous nongame birds, 9,327 pheasants, 10,283 partridges, 2,936 quail, 2,641 miscellaneous game birds, and 16,363 mammals, while no permits were required for the entry of 24,310 canaries, 4,176 miscellaneous nongame birds, 90 pheasants, 188 miscellaneous game birds, and 909 mammals.

At Honolulu 52 permits were issued authorizing the entry of 1,101 nongame birds (of which 1,045 were parrots), 142 game birds, and 3 mammals (monkeys). The game birds comprised 133 versicolor, Soemmerring, and ringnecked pheasants for stocking covers on Oahu, and 9 black swans.

For convenient comparison the importations under permit of the past six years are shown in the following table:

TABLE I.—*Importations of birds and mammals during the years 1908–1913, inclusive.*

Year.	Permits.	Canaries.	Pheasants.	Partridges.	Quail.	Other game birds.	Miscellaneous birds.	Mammals.	Total.
1908	460	325,285	4,415	7,781	724	9,533	47,487	1,958	395,520
1909	416	338,256	2,996	29,895	868	2,009	41,414	2,203	429,980
1910	519	361,054	7,200	18,931	1,933	2,481	48,778	6,660	458,401
1911	519	354,858	13,399	39,981	3,753	2,340	64,338	5,427	480,691
1912	583	362,604	15,412	23,181	7,751	3,742	44,387	5,457	462,534
1913	491	392,422	9,417	10,283	2,936	2,829	59,477	17,272	494,636

This table sets forth clearly the rise and decline of pheasant and partridge importations. It also shows a great increase in the importations of mammals in the past four years, especially in 1913, due to the large number of monkeys, guinea pigs, and mice brought in for experimental purposes. As the import duty on these animals was 20 per cent ad valorem (reduced to 10 per cent ad valorem by the new tariff law), it would seem that the needed supply of guinea pigs and mice might be profitably bred in the United States. The decrease in the number of nongame birds imported in 1912 was due chiefly to the cessation of the importation of Mexican parrots, of which several thousand were annually brought in at Eagle Pass, Tex., and New Orleans, and a new Australian law prohibiting export of many birds previously exported freely.

NATIONAL BIRD RESERVATIONS.

During the past year seven new national bird reservations were established by Executive order, making a total of 63 to date. The new ones are as follows: Chamisso Island, in Alaska; Pishkun, in Montana; Desecheo Island, in Porto Rico; Gravel Island, on Green Bay in Wisconsin; Aleutian Islands, in Alaska; Walker Lake, in Arkansas; and Petit Bois Island, in Alabama. These new reservations are important breeding sites for certain species of wild birds. A brief description is appended herewith:

ALEUTIAN ISLANDS, ALASKA.—This reservation embraces the islands of the Aleutian chain situated between the north Pacific Ocean and Bering Sea. These were set apart not only as a preserve and breeding ground for native birds but for the propagation of reindeer and fur-bearing animals, and for the encouragement and development of the fisheries.

CHAMISSO ISLAND, ALASKA.—This reservation, situated 2 miles south of the Choris Peninsula, is a mile and a quarter in length and half a mile in breadth. It is one of the important breeding rookeries on the northwest coast of Alaska. Among the birds that resort to it are horned puffins, Pallas's murre, Pacific kittiwakes, and the Point Barrow gull.

PISHKUN, MONTANA.—This reserve is about 8 miles from the Willow Creek Reservation and consists of two ponds surrounded by a

heavy growth of long grass about the shore, making an attractive nesting place for ducks during the summer. The Reclamation Service proposes to withdraw these sites for reservoir purposes, which, when completed, will leave several large islands in the lake offering ideal breeding grounds.

Petit Bois Island, Ala.—This reservation, situated in the Gulf of Mexico off the southern coast of Alabama, is adapted as a breeding place for certain sea birds. The island is uninhabited, the middle portion consisting of a series of open grassy flats, marshes, small ponds, and rolling sand hills, supporting a dense growth of timber, chiefly pines. The birds frequenting the reservation are laughing gulls, brown pelicans, black skimmers, least terns, royal terns, Louisiana herons, and black-crowned herons.

Desecheo Island, P. R.—This is a volcanic island in the Mono passage about a mile and a half long by a mile wide. It is densely covered with vegetation, the West Indian birch predominating, with large areas of four species of cactus and many shrubs. There is no water on the island. Few land birds inhabit the island, but over 15,000 sea birds of different species resort to it, consisting of boobies (between 8,000 and 10,000), red-footed boobies, man-o'-war birds, noddies, bridled terns, and laughing gulls.

The four reservation inspectors have rendered valuable services in instructing wardens, together with other work requiring a general knowledge of birds and mammals. During the past year wardens have been secured for the more important periods of the year for the Deer Flat Reservation, Idaho; Three Arch Rocks and Cold Springs, Oreg.; Quillayute Needles, Copalis Rock, and Flattery Rocks, Wash.; Tortugas Keys, Fla.; Walker Lake, Ark.; and Petit Bois Island, Ala. Regular warden service is maintained at the following reservations: Key West, Pelican Island, Pine Island, Mosquito Inlet, Indian Key, Passage Key, and Palma Sola, Fla.; Breton Island, La.; Loch Katrine, Wyo.; Lake Malheur and Klamath Lake, Oreg.; Chase Lake and Stump Lake, N. Dak.; Minidoka, Idaho; Niobrara, Nebr., and Saint Lazaria Island, Alaska. A special agent of the bureau is detailed each spring during the fishing season to look after matters on the Forrester Island Reservation, in Alaska, to prevent disturbance of the breeding birds.

Permits to trap on Lake Malheur and Klamath Lake Reservations were issued during the winter, and the reports show a notable decrease in the number of fur-bearing animals taken, the principal reason being deep snows and the severe cold weather prevalent during the months of December, January, and February. On Klamath Lake very little trapping was done, chiefly because a portion of the lake was reserved which had previously been overtrapped. On Klamath Lake the following fur bearers were taken: 26 mink, 2 skunks, 12 weasels, and 2 raccoons. On Lake Malheur 20 mink, 2,475 muskrats, 7 coyotes, 5 raccoons, and 1 weasel were trapped.

All of the reservations are in good condition, and the birds are increasing in numbers each season, proving that the object of the establishment of the reservations is being attained.

A severe storm visited Pelican Island and Mosquito Inlet Reservations, in Florida, beginning February 13 and continuing three days, with the effect that nearly all the birds of the first nesting on Pelican

Island were destroyed. Not to be discouraged, the parent birds returned to their island home as soon as conditions permitted and again nested, this time successfully.

An unusually early spring brought a number of waterfowl to the Lake Malheur Reservation, in Oregon, a month earlier than usual. Arriving before the ponds were free from ice, the ducks and geese became weak from lack of food and were unable to continue their migration. The warden, discovering the condition of the birds, purchased grain and fed them until they were able to leave.

The following brief information is given concerning some of the more important reservations:

Breton Island, La.—A steady increase is reported in nearly all of the species of birds inhabiting the different keys, an increase of 5,000 laughing gulls alone being reported.

Forrester Island, Alaska.—A noticeable improvement was observed by the warden in the use of this reservation as a nesting and breeding place for wild fowl. The stationing of a warden on this reservation part of the year is necessary on account of the salmon-fishing industry carried on by natives and others, 432 permits being issued by the warden, cooperating with the Bureau of Fisheries, for the season of 1913, as against 291 in 1912.

Lake Malheur, Oreg.—The increased amount of water in the lake has greatly improved conditions. During the equinoctial storm in March many bluebirds perished. A few species of birds remained at the reservation during the entire winter.

Mosquito Inlet, Fla.—This is one of the most important and interesting havens of refuge for water birds in the South, as well as a nesting and breeding place. A large increase of birds is reported on the inlet during the past year. It is important to note that the warden in charge reports an increase in numbers of the American egret during the months of November and December. The severe northeast storm visiting this reservation during the week ending January 14 destroyed a number of young least terns and washed away many eggs. The colony of these birds, however, is increasing each year.

Tortugas Keys, Fla.—This is another important bird reservation inhabited mostly by sooty and noddy terns, approximately 47,000 of the former birds having been noted on the island at one time last fall. The small number of noddy terns is partially accounted for by the destructive hurricane of 1910, which washed away the entire western side of the island.

Pelican Island, Fla.—Heretofore the pelicans have usually nested twice—the first time in September and the second in April. This year, however, the birds showed no intention of nesting the second time.

EXPEDITION TO LAYSAN ISLAND.

An expedition to the Hawaiian bird reservation was made, the party being under the direction of Commodore G. R. Salisbury, United States Navy, retired. The party of four left Honolulu on the U. S. revenue cutter *Thetis* December 15, and returned March 22.

This is the first time these Pacific bird colonies have been visited in winter. During the trip five of the islands comprising the reservations were inspected by the party, and a landing was made on four of them.

Rabbits were imported into Laysan several years ago, and they have multiplied to such an extent as to threaten the existence of the island vegetation. As a dearth of vegetation would jeopardize the bird colonies, which require shade, especially during the nesting season, the destruction of rabbits was made one of the main objects of the expedition, and the party succeeded in killing 5,000, or about one-half of the total colony.

A number of young coconuts were planted on Laysan, and the result of this experiment to secure a growth of trees on this almost treeless island will be watched with interest. Excellent specimens of the rare Hawaiian seal were secured from Laysan and Lysianski Islands, where they breed.

The colonies of birds nesting on Laysan and other islands of the reservation were found to be prospering, and no evidence was obtained that any of the islands have been visited by poachers since 1909.

NATIONAL BISON RANGE.

An addition of 14 calves to the herd of buffalo on the national bison range during the past year brings the total number to date to 96. Of the 82 adult animals 45 are females and 37 males. The animals are in excellent condition. The 11 head of elk on this range were increased by the birth of 4 calves, and 9 calves were brought to the range on March 11 from the Jackson Hole country. The 5 head of antelope have been increased by the birth of 4 calves. Both elk and antelope are doing finely.

FEEDING AND TRANSPORTING ELK.

On account of the unusually mild winter weather which prevailed in the Jackson Hole region of Wyoming, it was not necessary to feed the elk so extensively as during the previous winter. From the middle of February till April 21, 500 tons of hay were fed to about 4,000 elk. The loss of elk on the feeding grounds was very small.

One hundred head of elk were captured in Jackson Hole and transported over the Teton Pass to Driggs, Idaho, where they were shipped to several States. The first shipment was made on March 3, when 25 head left for Salt Lake City, to be liberated in the national forests in Utah. On the same day 15 head were started for Billy Meadows, in Oregon. On the following day 10 head were shipped to the Montana National Bison Range; 25 head to Hermosa Creek, in the Durango Forest, Colo.; and 25 head to Hunter Creek, in the Sopris Forest, Colo. These transfers were made with the loss of but 7 head, resulting probably, in most cases, from injuries received in the corral during capture.

Another lot of 100 elk was transferred from the Yellowstone National Park, being loaded and shipped at Gardiner, Mont., under the supervision of an agent of this bureau, March 4. These were consigned as follows: Twenty-five head to the national forests in Col-

orado; 25 head to the Sundance National Forest, in South Dakota; 25 head to the State game commissioner of Utah, for the State national forests; and 25 head to Walla Walla, Wash.

A fair increase is reported in the number of elk wintering in the Jackson Hole country last winter, with but slight loss (less than 100) from the usual winter casualties. According to the census made by this bureau in cooperation with the Forest Service, the total number was placed at 19,829, an increase of about 3,000 over last year.

According to the census made by the superintendent of the Yellowstone National Park, there were 28,729 inside the park belonging to the northern herd and 3,500 outside, or a total of 32,229. During the winter 538 elk were shipped from Gardiner to other ranges, and 200 by the Montana State authorities, which, added to the above total, reaches 32,967, an increase of 2,866 over 1912. Only about 340 were found dead—mostly yearlings. An estimate of the total number of elk in the Jackson Hole country and in the Yellowstone National Park is about 52,800, an apparent increase of 10 per cent. All the elk are reported to be in excellent condition.

ANTELOPE IN WYOMING.

A thorough investigation of the number and condition of antelope in the State of Wyoming by an agent of the bureau last winter established the fact that there are only about 6,000 head in the entire State, while only a few years ago this number was exceeded in one county alone. The alarming decrease of this animal is to be explained by unusually severe winters, illegal killing, predatory animals, and lack of food as a consequence of the number of sheep pastured in the region. The antelope are now confined to 9 counties, as follows: Albany, Laramie, Carbon, Sheridan, Johnson, Weston, Converse, Uinta, and Fremont, the largest number being in the last four named counties.

NIOBRARA BIG GAME RESERVE.

In the early part of the year 1912 Mr. J. W. Gilbert, the owner of a small big-game park at Friend, Nebr., generously offered his herd of buffalo, elk, and deer to the Government for preservation on national territory within the State of Nebraska. The lack of suitable quarters caused some delay in accepting the offer, but on November 14 of that year an Executive order was issued setting aside as a game preserve a tract of land additional to the Niobrara bird reservation, near Valentine, Nebr. The herd was then officially accepted by the Secretary of Agriculture, and preparations begun for establishing it on this very favorable location.

Through the cooperation of the National Association of Audubon Societies and the citizens of Valentine, Nebr., an inclosure was provided, at a total expense of $1,700. Some of the buildings remaining on the old Fort Niobrara Military Reservation were utilized as headquarters, and a warden was appointed on December 16, 1912.

The herd, consisting of 6 buffaloes, 17 elk, and 2 deer, was conveyed by railroad from Friend to Valentine about the middle of January, 1913. The land comprising this reserve offers a varied surface of low hills and table-land, interspersed with small groves

of pine and oak trees, affording range and shelter which could hardly be surpassed. The animals soon adapted themselves to the new location and are now thriving. Instructions have been given to the warden to afford citizens of the State every facility for viewing the herd, and on public-school holidays the bureau's agents have given instructive talks to the scholars and visitors. Frequently over 100 visitors a day have viewed the herd.

INFORMATION CONCERNING GAME.

The index to game legislation in the United States has been completed. Memoranda to the index of the more important laws have been prepared for all the States except Virginia, Washington, and Wyoming.

The usual annual game publications were issued, including the Directory of Game Officials and Summary of the Game Laws for 1912, beside three sets of small "ready-reference" card maps, containing matter of special interest to State game departments and others interested in game conservation.

INTERSTATE COMMERCE IN GAME.

Enforcement.—During the past two years the bureau has given particular attention to the enforcement of sections 242, 243, and 244 of the criminal code relating to the interstate traffic in game. With the limited force available it seemed best to concentrate efforts within a few States where violations are most numerous. The many convictions secured in the territory covered and the publicity given the Federal prosecutions have already materially lessened illegal shipments.

State authorities have given the bureau every assistance possible in this work, and wherever evidence has been gathered by this bureau, showing violations that can be prosecuted under the statutes of the State, the data have been turned over to the State game-warden department upon request.

Prosecutions.—Ninety-two cases have been closed, convictions following in every instance. Fines amounting to $4,712 were assessed and paid; 22,915 quail (*Colinus virginianus*) and 972 ruffed grouse (*Bonasa umbellus*) were involved in these shipments. The number of prosecutions disposed of by the bureau are given by States: District of Columbia, 2; Kentucky, 17; Maryland, 1; Michigan, 8; Missouri, 1; North Carolina, 9; North Dakota, 1; Ohio, 1; Pennsylvania, 2; Virginia, 46; West Virginia, 2; Wisconsin, 2.

Pending cases.—In addition to the cases disposed of during the year, there are now pending 125 cases, as follows: Virginia, 17; North Carolina, 20; Tennessee, 21; West Virginia, 9; Kentucky, 12; Massachusetts, 1; Pennsylvania, 10; Minnesota, 10; Michigan, 7; Missouri, 2; New Hampshire, 1; New Jersey, 3; Maryland, 1; Wisconsin, 7; Ohio, 2; North Dakota, 1; Illinois, 1.

Investigations.—This bureau now has under investigation nearly 1,000 cases involving the interstate shipment of game, the number of quail and ruffed grouse in these shipments being more than 100,000.

COOPERATION IN GAME PROTECTION.

During the year the Biological Survey cooperated with a number of organizations and State officials and has received assistance in connection with its work of protecting big game and game birds in various parts of the country:

With the Forest Service in establishing herds of elk on national forests in Utah, Colorado, and South Dakota, and in collecting information regarding the condition of big game in Colorado and Wyoming.

With the Department of the Interior in ascertaining the condition of big game in the Yellowstone National Park and in shipping elk from the park to national forests.

With the Treasury Department in regulating the importation of foreign birds and mammals and in dispatching the expedition to Laysan, the Hawaiian bird reservation in the mid-Pacific.

With the American Bison Society in the establishment of the proposed national game preserve in the Wind Cave National Park, in South Dakota.

With the National Association of Audubon Societies in patrolling bird reservations, especially in Florida, Louisiana, Michigan, and Alaska; and in a study of the birds on the St. Lazaria Reservation during the summer of 1912; with the Bureau of Fisheries in a study of the food habits of the fish-eating birds on the Forrester Island Bird Reservation, Alaska, in the spring of 1913; and with the citizens of Valentine, Nebr., in stocking the Niobrara Reservation with a herd of buffalo, elk, and deer.

Through cooperation with the State warden of Oregon the herd of elk on the Wallowa Forest Reserve has been cared for during the year; a census of the big game of Oregon obtained, assistance rendered in the protection of birds on the Malheur, Klamath, Cold Springs, and Three Arch Rocks Reservations, and quarters furnished in Portland for the bureau district inspector.

With the Civil Service Commission and State game warden of Wisconsin a plan was devised and experimental work conducted in developing a system of promotion examinations for deputy game wardens in the effort to raise the standard of the warden service in the various States.

WASHINGTON : GOVERNMENT PRINTING OFFICE : 1913